

Prediction Of Gain Expansion And Intermodulation Performance Of Nonlinear Amplifiers

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Summary

A mathematical model for the input-output characteristic of an amplifier exhibiting gain expansion and weak and strong nonlinearities is presented. The model, basically a Fourier-series function, can yield closed-form series expressions for the amplitudes of the output components resulting from multisinusoidal input signals to the amplifier. The special case of an equal-amplitude two-tone input signal is considered in detail. The results show that unless the input signal can drive the amplifier into its nonlinear region, no gain expansion or minimum intermodulation performance can be achieved. For sufficiently large input amplitudes that can drive the amplifier into its nonlinear region, gain expansion and minimum intermodulation performance can be achieved. The input amplitudes at which these phenomena are observed are strongly dependent on the amplifier characteristics.

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